REMARKS

In the Office Action dated July 12, 2005, the Examining Attorney enumerated a number of objections and rejections. Each of these issues will be addressed in this response in the same order as provided in the Office Action.

Claim Objections

Claims 1-19 were objected to because of informalities relating to the use of the word "it" instead of - - said reflected beam - - in claims 1 and 10. The enclosed amendment provides the language recommended by the Examining Attorney to address this informality without affecting the scope of these claims.

Claim Rejections Under 35 USC § 112

Claim 4 was rejected as being indefinite under 35 USC § 112. Specifically, the phrase "the first direction is forty five degrees relative to the impingement beam was found to conflict with the figures." The Examiner correctly observed that the drawings show that the first direction and the impingement beam shown in at least one of the figures is ninety degrees instead of forty five degrees as originally claimed. The applicant has amended claim 4 to provide for a ninety degree angle instead of a forty-five degree angle as originally provided.

Claim Rejections Under 35 USC § 103

Claims 1-3, 6-7, 10 and 15-19 were rejected as being obvious over Hammond, Jr. et al, U.S. Patent No. 5,430,286 in view of Wakimoto et al., U.S. Patent No. 4,867,545.

The applicant substantively agrees with only portions of the Office Action's characterization of Hammond. The Examining Attorney has correctly identified that Hammond fails to particularly teach or fails to suggest that the lens could be a telecentric

lens. Unfortunately, what the Office Action misses is that Hammond shows a bar code scanner that uses a light source, photo diode system of lenses, apertures and field stops in a specifically prescribed configuration with well prescribed alignments and tolerances to read bar codes. Bar codes are linear. They comprise a number of characters they can be up to several inches long. The sweeping spot of light as taught by Hammond is ideal for such an application.

In order to create a spot of light used for sweeping across the bar code (i.e., scanning it), Hammond uses an intricate arrangement of components to devise a scanner as shown in Figure 7 in one embodiment. Hammond teaches that a scanner starts with a light source 426 that is <u>described and illustrated</u> as diverging as soon as it leaves its point of origin. (Col. 1, lines 60-63, Col. 5, lines 53-54). Light divergence and convergent angles are critical to the operation of the Hammond device. (See column 6, lines 11-20). To control the angle of divergence 418 it passes light through field stop 420 where the pupil of the field stop defines the center point and angle of the impingement beam 436 and eventually the spot size 417. This directs the impingement beam 436 through aperture 528 and a first lens 514. At this point, the beam begins to converge at angle 419 continuing convergence through beam splitter 415 until reaching the correct spot size 417 correlating to the width of a narrow bar 413 on bar code 412. <u>The distances and alignment between these internal scanner components are critical to the correct angles of divergence and convergence to enable the formation of the correct spot size on the target</u>.

As the spot is swept over the bar code, other portions of the scanner come into play. The reflected light beam from the scan spot 417 begins to diverge for each bar or space scanned at angle 419 through the beam splitter 415. As the reflected beam passes through a

second lens 414 and aperture 428, it is forced again to converge at angle 438 onto light sensor field stop 422 through its pupil and onto light sensor (photodiode) 428. The system is so geometrically balanced that Hammond even states that the positions and light source 426 and the light sensor 424 could be exchanged without affecting the function of the device. Although working depth requirements for scanning depths of field could change, internal balance through distances and positions of components are critical for beam angles to be controlled. Furthermore, Hammond warns that while omission of field stops **20, 22** is possible, it may cause interference from filament images and the structural detail of the light sensor (Col. 5, lines 32-37).

It is important to remember that the Hammond reference is designed to read a bar code and not a matrix symbol. If the Hammond system were attempted to be utilized to read a matrix symbol, it would fail. Specifically, the data elements of most, if not all, matrix symbols are the same size (i.e., no wide and narrow elements). Since a matrix code is just that, i.e., matrices are not likely to contain linear elements, there is no straight line sweep of a spot. There are no reflectance and absorption factors, just degrees of reflection. Finally, many matrix marks on products are located on curved or angled surfaces so that they would not be perpendicular to the impingement beam. The reflected beam could proceed in a direction other than toward the photodiode which could cause problems.

The combination of Wakimoto with Hammond is believed to create an unworkable bar code reading system and not teach the claimed combination of the rejected claims. Under MPEP § 2143.01, this would be an improper rejection (See In re Gordon, 733 F.2d 900,221 USPQ 1125 (Fed. Cir. 1984).

The Wakimoto system as shown and described in U.S. Patent No. 4,867,545 is much more involved than: "a telecentric optical system having a first lens serving as a magnifier lens". The image-forming optical system taught by Wakimoto actually utilizes three in-line telecentric lenses (of which two are moveable) and together form a magnification function more than two-fold with satisfactory image-forming performance. As stated in Wakimoto, and cited by the Examiner in Col. 2, lines 10-15: "the present invention was made to solve the above described problems and has for its essential object to provide a telecentric image forming his optical system which enables the correction of an image-forming magnification, where by an error has occurred in processing a lens is compensated." One of the specific limitations of Hammond is that the precise placement of lenses relative to one another is for the purpose of reducing aberrations and controlling light angles where the Wakimoto system is utilized to form images, not to provide the specific light beam angles required to fit the Hammond system.

As stated above, as it relates to Hammond system, it is a balanced system designed with components having particular positions. These components and resulting angles are described as being critical for operation as a bar code scanner.

Nevertheless, let's suppose that somehow the Wakimoto "system" replaced or was utilized in conjunction with one of the lenses 514 or 414 in Wakimoto.

In the first case, suppose lens 514 was replaced with the Wakimoto optical system. If this were done, the triple telecentric magnifying lens addition would actually cause the impingement beam to <u>diverge</u> instead of <u>converge</u> at an angle as prescribed by current lens 514. Changing the impingement beam at aperture 528 to a diverging one instead of a converging one would <u>disable</u> the Hammond system. The now diverging beam passes

through the beam splitter still diverging and reaches the target 412 as a light spot many times the size of the desired diameter. The area covered by the spot would scan many bars and spaces simultaneously instead of one bar or space at a time. The reflected beam would depart the substrate containing the bar code and diverge as planned, but upon reaching lens 414, it would have a spot size many times larger than the aperture could allow to pass and much more information than a single bar or space. Therefore, only a portion of the information could pass through the aperture 428. Of that information that passed the aperture 418 and lens 414, only a portion of that would be able to pass through the pupil of the field stop 422 to be understood by the photodiode 424. At this point the photodiode 424 would not be able to process the information in the beam since it no longer relates to the designed spot size, convergence and divergence angles or a single bar or space. Accordingly, this combination of elements would create an inoperable system.

In the second case, suppose lens 414 were replaced with the Wakimoto optical system. If this were done, the triple telecentric magnifying lens would cause the reflected beam to diverge instead of converge at angle 438 as prescribed by current lens 414. Changing the reflected beam at aperture 428 to a diverging one instead of a converging one would also disable the Hammond system. The now diverging beam would attempt to pass through the pupil of the field stop 422 to be understood by the photodiode 424. At this point the photodiode 424 would not be able to process the partial information in the beam since it no longer relates to the designed spot size, convergence and divergence angles or a single bar or space.

Of course, as a third example, both lenses 414 and 514 could be replaced with the Wakimoto optical systems. If this were done, the triple telecentric magnifying lens addition

would cause the impingement beam to diverge instead of converging at an angle as prescribed by the current lens 514. The now diverging beam passes the beam splitter still diverging and reaches the target 412 as a light spot many times the size of the desired diameter. The area covered by the spot would scan many bars and spaces simultaneously instead of one bar or space at a time as designed. The reflected beam would depart the substrate containing the bar code and diverge as planned, but upon reaching the triple telecentric magnifying lens where lens 414 was replaced. The telecentric lens at positions 414 would cause the reflected beam to diverge again instead of converge at an angle 438 as prescribed by the current lens 414. The now continuing divergent beam would attempt to pass through the pupil of the field stop 422 to be understood by the photodiode 424. At this point, the photodiode 424 would not be able to process the information. The system would not operate as intended.

In summary, combining the teachings of Wakimoto with Hammond creates an unsolvable problem with light beam diverging instead of converging as desired by lenses 514, 414. The Hammond system as modified by the combination would be disabled and not function as designed.

Accordingly, there is no teaching or suggestion apart from the applicant's disclosure to provide the structure for the combination of elements proposed in Applicants claims. The rationale provided by the Office Action is an unworkable combination of elements. Accordingly, the applicant requests retraction of this 35 USC § 103 rejection since the combination creates a system unworkable for its intended purpose.

Claims 5-9 were rejected over the combination of Hammond and Wakimoto in further view of Marom, U.S. Patent No. 5,315,095.

Rejecting claims 5 and 9 utilizing the Marom reference together with Hammond and Wakimoto is also believed to be improper. To create a system of Marom, Wakimoto and Hammond, the Wakimoto telecentric lens must be positioned at the Hammond 414 lens position. The Marom collimation lens would then be positioned in lieu of or in addition to the Hammond 514 lens. The Marom collimated light appears to create a similar problem as the Wakimoto telecentric lens at lens position 514. If this were done, the collimation lens addition would cause the impingement beam to be collimated instead of converging at an angle as prescribed by current lens 514. Changing impingement beam aperture 528 to a collimated one instead of a converging one appears to disable the Hammond system. The now collimated beam would pass the beam splitter still collimated and reach the target 412 as a light spot many times the size of the desired diameter. The area covered by the spot would scan many bars and spaces simultaneously instead of one bar or space at a time. Such a beam would then depart the substrate containing the bar code and diverge as planned, but upon reaching the triple telecentric magnifying lens of Wakimoto 514 it would replace the reflected beam and would diverge instead of converge creating further problems. Once again, the combination of elements suggested by the Examiner creates an unworkable system for its intended purpose.

Accordingly, claims 5 and 9 are believed to be separately allowed on this basis as well.

Claim 8 was rejected as being obvious over Hammond or Wakimoto in further view of Funk, U.S. Patent No. 6, 269,169. Funk teaches a reader for reading documents at close distances. Replacing the light source 426 with a fiber optic light pipe would likely provide the opposite effect as stated by the Examiner, namely, a light source too weak for bar code

scanning and not an improved illumination means. Fiber optic light pipes known by the applicant do not provide sufficient light for a bar code scanner. Nevertheless, this claim stands or falls with the claim from which it depends and is believed to be allowable on that basis.

Claims 11-14 are rejected as being unpatentable over Hammond, Wakimoto in further view of Gurevich et al., U.S. Patent No. 5,969,323 and Yoo et al., U.S. Patent No. 6,765,857. The applicant disagrees with this characterization. The Gurevich invention teaches two laser beams, the first in a first polarized orientation, the second in a second polarized orientation orthogonal to the first beam, a polarizing element in the path of the first and second beams to combine them for the purpose of eliminating the effects of parallax and vignetting. The polarizing element may comprise a beam splitter and the light sources may comprise laser light sources such as laser diodes.

In combining Gurevich with Hammond as modified by Wakimoto, the Office Action fails to describe the function of the Hammond focusing lens 514 and aperture 528 that remains in the path of the Gurevich dual light configuration. Gurevich relies on the beam splitter to combine the two light sources and does not address the potential effects of a stop 420, the pupil of which the dual light sources must pass in the focusing lens 514. The Hammond 420/514/528 system elements would undesirably combine the beams to the desired spot size, affecting the amount and quality of information that reaches the photodiode for processing. Furthermore, the Wakimoto system at lens 414 would continue to <u>diverge</u> (instead of <u>converge</u>) any received beams therefore creating an unworkable system. The supposed modification by the Office Action <u>will not work</u>.

Yoo teaches the use of two beam splitters. As stated above, the Gurevich invention teaches the use of two laser beams. In the Examiner's proposed configuration, the Hammond 420/514/528 system elements are removed and replaced with the first light source and the second light source which are allowed to pass directly to a first beam splitter and a second beam splitter, respectively, for directing light onto the target. In this configuration, the two Gurevich laser beams are no longer combined at one beam splitter as taught by Gurevich, raising the question as to the effectiveness of the two polarized beams when they reach the target. Since these two Gurevich laser beams are being reflected to the target by two Yoo beam splitters, it seems that the potential for focus and spot size problems would abound. Also, if the laser beams reflect as anticipated, the reflected light beam must still pass through the Wakimoto telecentric lens system causing it to diverge instead of converge. The photodiode would have an unknown amount and unknown quality of information to try to process thereby once again creating an unworkable system.

Conclusion

The Hammond system reads bar codes one bar and space at a time like all bar code scanners known to the applicant. The spot 417 first is focused on a narrow black bar 413 on the bar code 412 for its diameter calibration. This makes the spot size critical. Hammond teaches that a scanner that starts with a light source 426 naturally begins diverging as soon as it leaves its point of origin. Light divergence and convergence angles are critical to the operation of the Hammond system. The distance and alignment between the Hammond internal scanner components (light source, field stops, apertures and lenses) enable the formation of the correct spot size on the target as well as on the photodiode, and are critical. The teachings of Wakimoto are not compatible with the teachings of Hammond. Replacing

lenses that cause beams to diverge instead of converge at prescribed angles at prescribed times with one or two Wakimoto telecentric lens systems in the Hammond system creates an unsolvable problem with light beam divergence and convergence, spot size and processing at the photodiode. The Hammond system would be disabled as a bar code scanner and would still not function as the type of optical system needed to scan a directly marked matrix symbol.

In light of this explanation, the Applicant has shown that the proposed combination of elements creates an unworkable combination of elements and does not teach the claimed invention. The applicant respectfully requests the Examiner withdraw rejection of claims 1-19. Allowance is respectfully requested.

Respectfully submitted,

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***** VERSION SHOWING CHANGES MADE *****

1. (Currently Amended) A symbol reader for reading marked regions on a substrate comprising:

at least one light source providing an impingement beam;

a beam splitter receiving the impingement beam from the at least one light source and splitting the impingement beam emitted from the at least one light source to allow some light from the impingement beam to contact the substrate as a contact beam while allowing some light to proceed in a first direction to not contact the substrate;

a reflected beam proceeding one hundred and eighty degrees relative to the contact beam returned from the substrate, said reflected beam proceeding into the beam splitter where a first portion of the reflected beam is directed in a second direction 180 degrees relative to the first direction, and a second portion of the reflected beam passes through the beam splitter;

a telecentric lens positioned relative to the beam splitter to receive one of the first and second portions of the reflected beam after passing through the beam splitter;

a sensor located opposite of the telecentric lens from the beam splitter, said sensor receiving the portion of the reflected beam after ~~it~~ <u>said reflected beam</u> passes through the telecentric lens.

2. (Original) The symbol reader of claim 1 wherein the impingement beam, beam splitter and substrate are collinear.

3. (Original) The symbol reader of claim 1 wherein the telecentric lens, beam splitter and substrate are collinear.

4. (Currently Amended) The symbol reader of claim 1 wherein the first direction is ~~forty five~~ ninety degrees relative to the impingement beam.

5. (Original) The symbol reader of claim 1 wherein the at least one light source provides light having an infrared wavelength.

6. (Original) The symbol reader of claim 1 wherein the at least one light source further comprises at least one LED.

7. (Original) The symbol reader of claim 6 wherein the at least one light source further comprises a beam combiner.

8. (Original) The symbol reader of claim 6 wherein the at least one light source further comprises a fiber light pipe directing the impingement beam at the beam splitter.

9. (Original) The symbol reader of claim 1 wherein the at least one light source provides collimated light.

10. (Currently Amended) A symbol reader for reading marked regions on a substrate comprising:

at least one light source providing an impingement beam;

a first beam splitter receiving the impingement beam from the at least one light source and splitting the impingement beam emitted from the at least one light source to allow some light from the impingement beam to contact the substrate as a first contact beam while allowing some light to proceed in a first direction to not contact the substrate, said first direction ninety degrees relative to the first contact beam;

a reflected beam proceeding one hundred and eighty degrees relative to the first contact beam returned from a contact area on the substrate, said reflected beam proceeding into the first beam splitter where a first portion of the reflected beam is directed in a second direction 180 degrees relative to the first direction, and a second portion of the reflected beam passes through the beam splitter;

a telecentric lens positioned relative to the first beam splitter to receive one of the first and second portions of the reflected beam after passing through the beam splitter;

a sensor located opposite of the telecentric lens from the first beam splitter, said sensor receiving the portion of the reflected beam after ~~it~~ said reflected beam passes through the telecentric lens.

11. (Original) The symbol reader of claim 10 further comprising a second beam splitter and a second light source, said second light source providing a second impingement beam to the second beam splitter and the second beam splitter providing a second contact beam to the substrate to contact the substrate at the contact area.

12. (Original) The symbol reader of claim 11 wherein the second contact beam is substantially colinear with the first contact beam.

13. (Original) The symbol reader of claim 11 wherein the second light source is provided by a light emitting diode.

14. (Original) The symbol reader of claim 11 wherein the first beam splitter further comprises a 50/50 mirror.

15. (Original) The symbol reader of claim 10 wherein the telecentric lens receives the first portion of the reflected beam, and the telecentric lens is located substantially the same distance from the substrate as the first beam splitter.

16. (Original) The symbol reader of claim 10 further comprising a mangifier lens proximate to the telecentric lens.

17. (Original) The symbol reader of claim 10 wherein the telecentric lens has an optimum range intermediate about 3-4 inches to about 15 inches.

18. (Original) The symbol reader of claim 10 wherein the substrate is angled relative to a plane perpendicular to the first contact beam at the substrate intermediate about zero and about forty five degrees.

19. (Original) The symbol reader of claim 10 wherein the telecentric lens has an optimum range up to at least 20 feet.